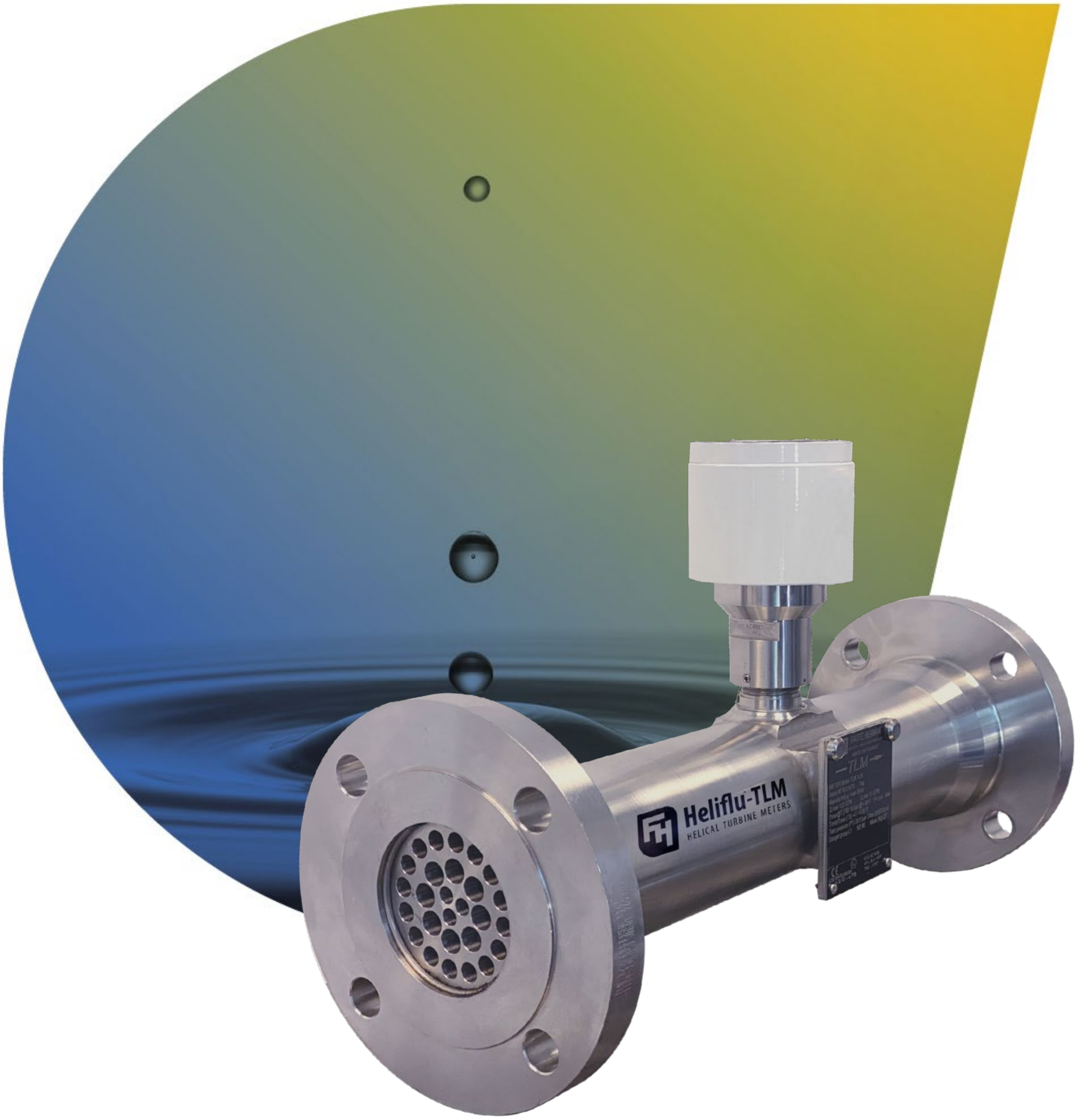
Faure Herman
Counting every drop



Heliflu-TLM

User's Manual

Content

General TLM

Faure Herman's Heliflu™ TLM turbine meters are designed principally as Truck Loading Meters, thus the TLM designation. These meters are expressly designed for commercial transactions. They deliver accurate and reliable volume measurements of moderate viscosity liquids (less than or equal to 15 cSt) which typically are part of a loading or unloading operation. Their simple yet robust construction ensures very good accuracy and excellent measurement repeatability for many industrial uses.

The Heliflu™ TLM employs a stand-alone measurement assembly (also called a cartridge), which can be calibrated independently of the measuring body installed inline. This makes measurements completely independent of changes in liquid pressure. The Heliflu™ TLM expands its use by offering different flow ranges by size and thus significantly reduce maintenance costs.

Signal Generation

The operating principle of TLM meters is based on measuring the rotation speed (instant flow) along with the number of revolutions (quantity) of the helical-bladed rotor positioned in the center of the pipe. The operating principle of helical turbine flow meters is based on the electromagnetic field generated by the rotational velocity of magnets imbedded in blades of the helical rotor passing by a pick-up coil positioned in the flowmeter body.

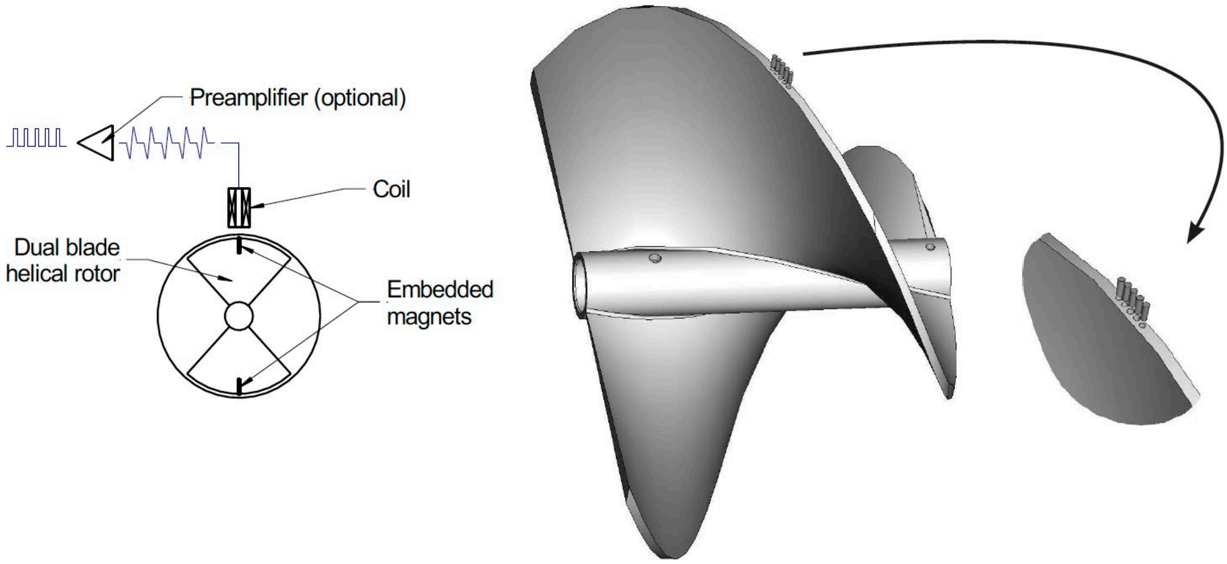


Figure 1. Signal generation principle

Processing the generated signal determines the value of the instantaneous flow such as : **Q** = x 3600 , and the amount of liquid transferred such as: **V** = .

WITH

Q Flowrate in m3/h [l/min, GPM, BPH

F Hz signal frequency

Kf Factor specific to the meter cartridge, determined at the time of calibration in pulses/m3 (pulses/l, pulses/USG, pulses/Bbl)

V Volume in m3 (litres, gallons, Bbls)

N Number of pulses

Meter Components

The Heliflu™ TLM turbine meters are comprised of the following parts:

- Body
- Measurement cartridge
- Flow conditioner
- Detection assembly
- Tightening ring

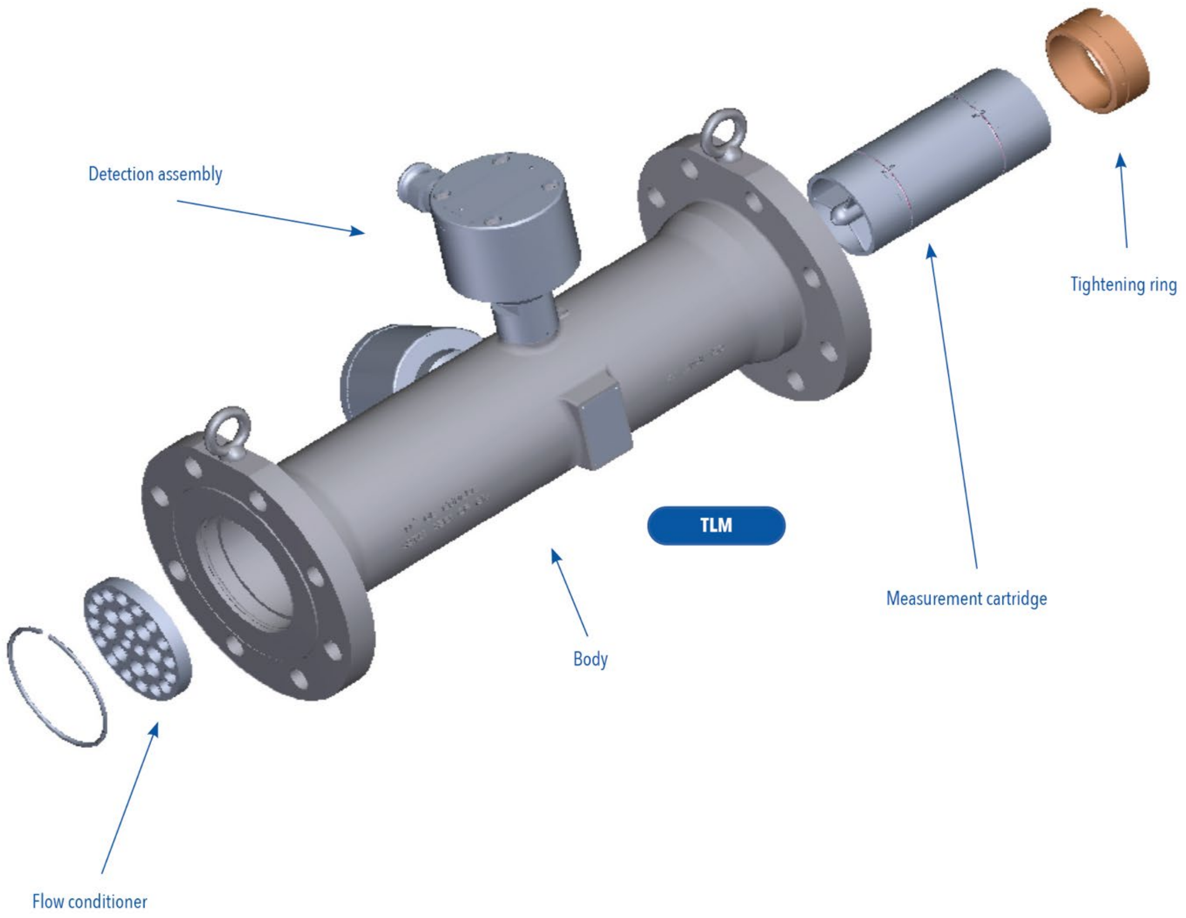


Figure 2 - Composition of TLM

Body

The TLM's body is manufactured from stainless steel. The meter features welded or screwed "bosses" on the body allowing the installation of the detection pick-up coil along with the positioning of the electrical outlet box which holds the preamplifier.

The TLM outer body also incorporates:

- An arrow indicating the direction of flow of the liquid
- The manufacturer's plate for the identification of equipment

Measurement Cartridge

The measurement cartridge contains all the elements contributing to the operation of the rotor and can be calibrated independently of the meter body. The cartridge is inserted or removed from the downstream end of the measuring body.

The TLM cartridge includes:

- A shell made of stainless steel (AISI 316L or equivalent) which houses all the other elements of the measurement cartridge.
- The upstream and downstream cross-pieces contain the bearings that ensure the centering of the rotor. These cross-pieces are also made of stainless steel (AISI 316L or equivalent)
- The rotor (aluminum or titanium) features Faure Herman helical blades. Each rotor is equipped with magnets and rotates on a shaft, allowing for the generation of electrical pulses through the detection coil.

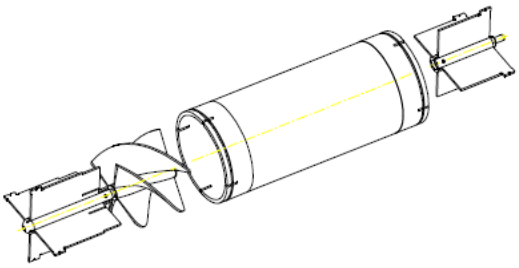


Figure 3. Measurement Cartridge

Signal Detection assembly

The electrical assembly or assemblies intended for signal generation are integrated into one or more outlet boxes that allow equipment to be implemented in hazardous areas. The assembly includes:

- A pick-up coil positioned in the boss and held by a screwed ring or locking ring.
- A link cable that connects the pick-up coil to a totalizer — or an optional preamplifier

The optional preamplifier can significantly increase the distance allowed between the equipment and the acquisition system (up to 5,000 m).

Flow conditioner

The TLM meter incorporates a fitted flow conditioner "plate" positioned in the upstream flange. This feature improves turbine meter performance, which may otherwise be affected by fluid rotation and asymmetry in the upstream flow profile induced by the configuration of upstream piping (elbows, section reductions, etc.) and accessories (valves, filters, pumps, etc.).

This configuration allows the installation of TLM meters without additional straight run upstream and/or downstream lengths.

Reception, Storage and Handling

Upon receipt of your Heliflu™ TLM meter, check the general condition of the package in order to immediately identify any damage suffered during transport. Please then remove the equipment from its packaging and check its general condition. Your shipment should also include the presence of this manual and the calibration certificate.

Before installation, it is recommended to keep the TLM in its original packaging, free from severe weather conditions and possible shocks. The storage temperature should remain between -50 and +60° Celsius (-58 /140° Fahrenheit).
If the equipment is not put into service within one month of receipt, keep it under inert gas (nitrogen) or full of liquid (light hydrocarbon).

Before the equipment is mounted on the meter run, carry out a thorough visual examination to identify the direction of flow, the serial number, the area of operation, the flange class, etc.

If the equipment is damaged and/or the documentation is not complete, contact Faure Herman immediately by phone, email or via the website:

Customer support	
Hotline:	+33 (0)2 43 60 28 55
	+1 713 623 0808 (USA)
Email:	services@faureherman.com
Website:	https://faureherman.com/

Installation

TLM turbine meters can be installed horizontally, or vertically, subject to an upward flow. In all cases, the direction of flow on the indicator plate must be respected.

Preparing for installation

Before installing the meter, check for:

- Deposits or significant pollution in the upstream piping section
- Correct flow direction (indicator plate)
- Matching flange dimensions and seal faces between upstream/downstream pipes and equipment
- Alignment of the meter with the piping upstream/downstream and the absence of obstacles to the flow
- Positioning of electrical outlets

LIKE ANY PRECISION INSTRUMENT, YOUR TLM MUST BE HANDLED WITH CARE

Installation

Before the meter is put in place, it is recommended to keep it in its original packaging, protected from severe weather conditions and possible shocks.
The equipment must be inserted on the meter run after checking and possibly correcting the alignment of the flanges so as not to generate stress when applying the torque.

Equipment should only be installed with appropriate tools.

- Never use a hammer
- Use torque wrenches with caution. Check torque settings in Figure 4 below.
- Spreaders can be used to insert equipment on a pre-installed run.

Joints

Always use gaskets adapted to the types of flanges and compliant with ASME B16.20 and ASME B16.21 or NF EN 1514 and NF EN 12560.

NEVER REUSE GASKETS!

Hardware

All fasteners used to mate the TLM to site piping should adhere to the ASTM A 193 B7 (threaded rods) and ASTM A 194 2H (nuts) standards in accordance with ASME B16.5 for applications at temperatures between -50 and 480 degrees Celsius.

Tightening torque

Size and Torque Tightening Uncoated Bolts				Size and Torque Tightening Coated Bolts			
M	N.m	NPS	ft-lb	M	N.m	NPS	ft-lb
16	160	5/8	120	16	130	5/8	90
20	350	3/4	210	20	250	3/4	160
24	550	7/8	350	24	450	7/8	250

Figure 4. Recommended tightening pairs for Klingersil-type joints

Properties of measured fluid

The service life of the TLM and the reliability of its measurements can be seriously diminished by the presence of gas vapors and/or solid particles in the measured liquid.

The presence of gas, in the form of bubbles or emulsion, results in a significant degradation of performance. The passage of gas "pockets" between two sections of liquid can result in the destruction of the rotor shaft arrangement causing serious measurement errors. To reduce risk of injection/gas generation upstream of the meter, install a purging or degassing system upstream of the meter. For elevated installations, it is strongly recommended not to position the meter in a "high" area within which a gas pocket could form under the effect of gravity and/or the reduction of volumes during a flow stoppage.

Solid particles within the liquid flow, even if miniscule, can progressively damage the meter's fixed or moving elements (cross-pieces, rotor) and can result in gradual performance degradation. Larger solid particles can quickly cause permanent damage to these same meter components.

Recommended filtering

Protecting the meter and downstream components from liquid pollution can be critical during the start-up phases of a new facility or after performing work ahead of the meter station. In order to minimize the risk of damage to equipment by solid particles contained in the flow, the degree of filtration defined in the following table needs to be respected.

TLM					Recommended Filtering	
TLM Type	DN mm	Max flow m^3/h (max)	DN inches	Max flow GPM	(mm)	MESH
TLM 3-30	80	30	3	132	0.85	20
TLM 3-50	80	50	3	220	0.85	20
TLM 3-70	80	70	3	308	1.4	14
TLM 3-110	80	110	3	484	1.4	14
TLM 3-150	80	150	3	660	1.4	14
TLM 4-70	100	70	4	308	1.4	14
TLM 4-110	100	110	4	484	1.4	14
TLM 4-150	100	150	4	660	1.4	14
TLM 4-200	100	200	4	880	1.7	12
TLM 4-300	100	300	4	1,321	1.7	12

Figure 5. Recommended Filtration

IMPORTANT: At the end of the initial commissioning and ongoing operations, the degree of filtration can be slightly decreased to reduce maintenance and pressure losses associated with the filter, provided contamination load is reduced.

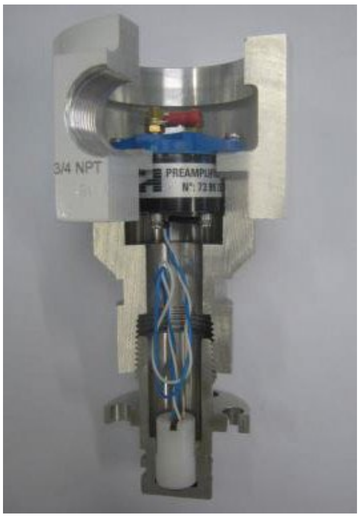
When an air and gas disposal device is integrated into a meter run it must be placed immediately upstream of the Heliflu™ TLM — without any other accessory between its output and the intake of the meter.
In order to avoid significant measurement errors and potential damage to the meter by cavitation, the minimum downstream pressure of the meter must remain above: $2 \times \Delta P + 1.25 \times P_v$
With
ΔP Measured pressure loss at the (maximum) operating rate in kPa [psi]
P_v liquid vapor pressure under conditions of use in kPa [psi]

Note: For Liquefied Petroleum Gas (LPG), the minimum downstream pressure of the meter will be set at Pv + 1 bar [+ 14.5 psi]

Electrical installation

Faure Herman's standard TLM turbine meter incorporates two signal detection assemblies generating two independent pulse trains. A preamplifier should be integrated into the assembly when the distance between the meter and the acquisition system is greater than 200 m (600 ft). The preamplifier receives the low voltage sinusoidal signal generated by the pick-up coil, shapes and amplifies it to allow reliable transmission over longer distances. The FH71 preamplifier is available in either 2 wires (Intrinsic Security - Stan- dard FH or NAMUR) or 3 wires (In an explosion proof outlet box - Open Collector).
The pick-up coil/preamplifier connection is completed in the factory.

2 or 3 wire preamp



No preamp

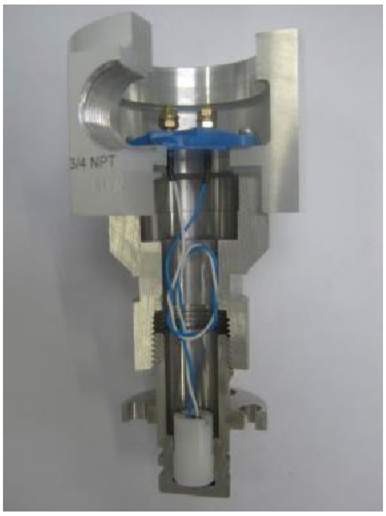


Figure 6. Electrical configuration with and without a preamplifier

The Explosion Zone classification must be checked before the meter is connected to the site (see ATEX or UL Indicator Plate).
Depending on the type of preamplifier used (2-wire: Standard FH or NAMUR, or 3-wire: Open Collector), and the configuration of the installation, the electrical connection of the meter will be made according to the diagrams presented below.


2 - wire preamplifier (Standard FH / NAMUR)

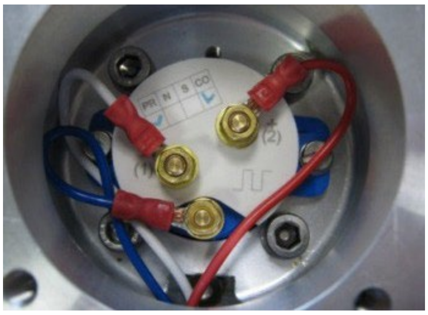

3 - wire preamplifier (Open Collector)

Figure 7. Types of preamplifiers

Wiring schemes

The on-site electrical connection depends on:
The type of protection (Intrinsic Safety, explosion - proof)
Features of the inlet of the acquisition system (entry impedance, type of current detection/tension, etc.)
Characteristics of the cable implemented (resistance, inductance, capacity, etc.)

The wiring diagrams below can be used for standard configurations.
Other configurations are available on request.

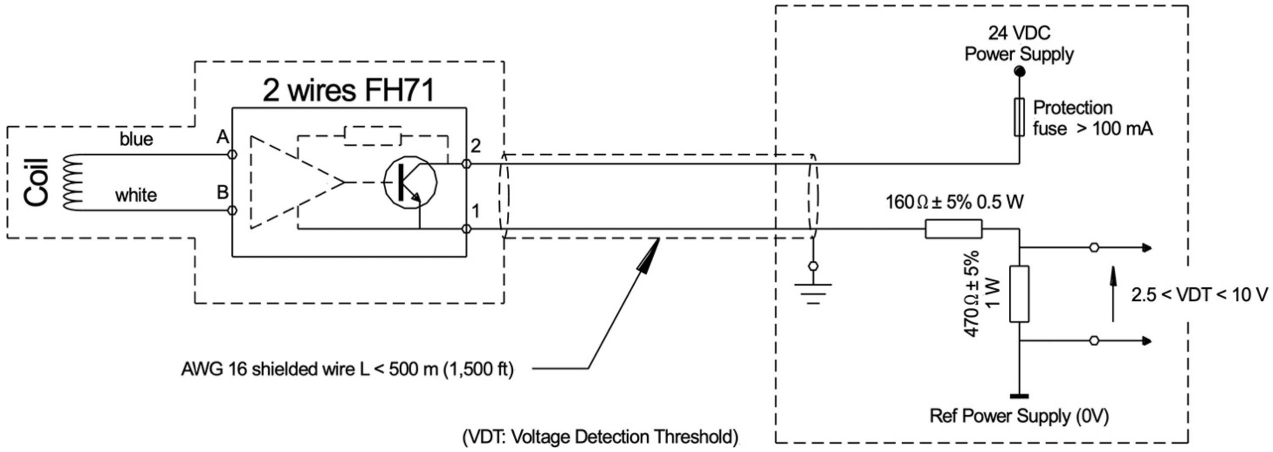


Figure 8. Example: Connecting a 2-wire preamplifier with an input impedance of 10 k

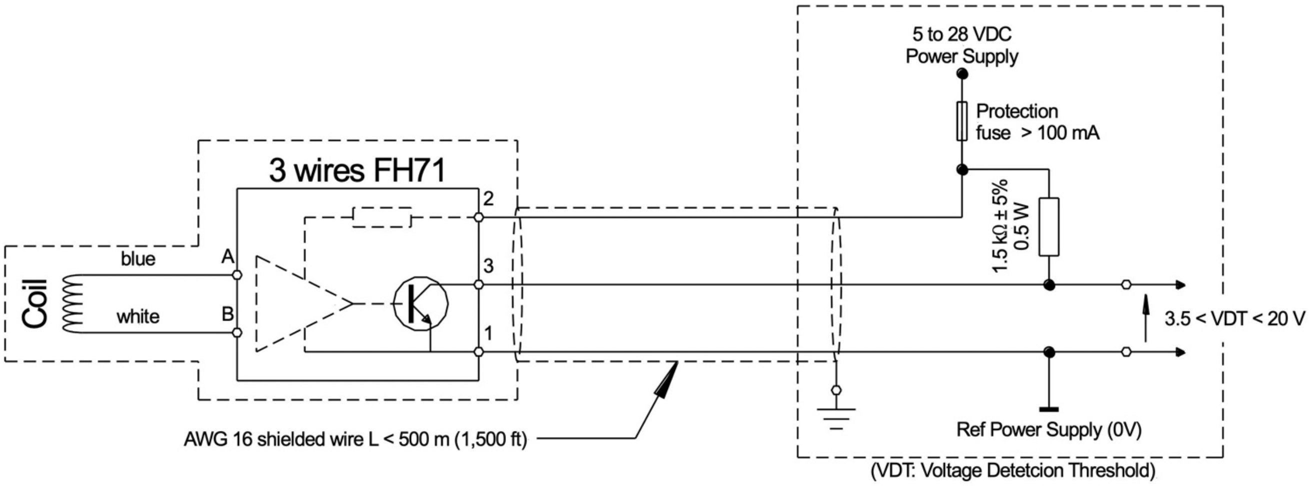


Figure 9. Example: Connecting a 3-wire preamplifier (Open Collector)

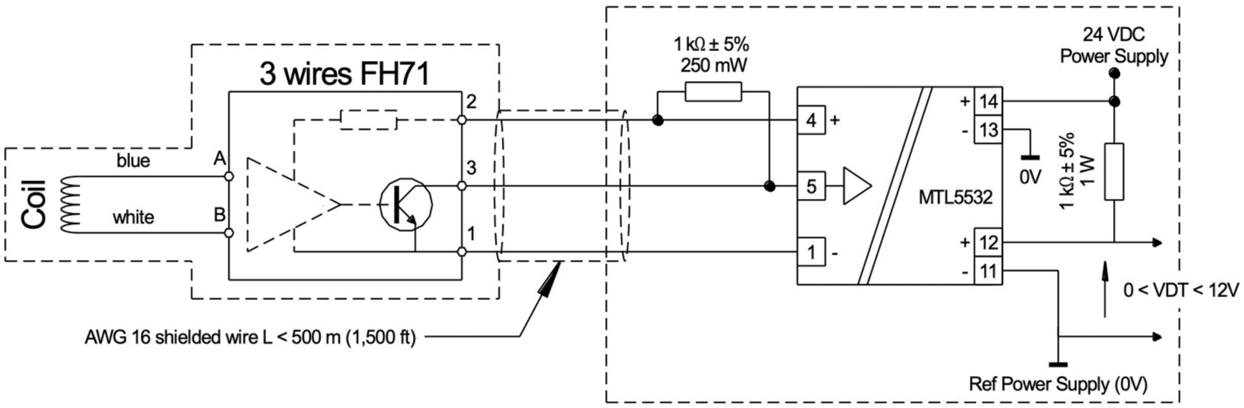


Figure 10. Example: Connecting a 3-wire preamplifier (Open Collector) with barrier

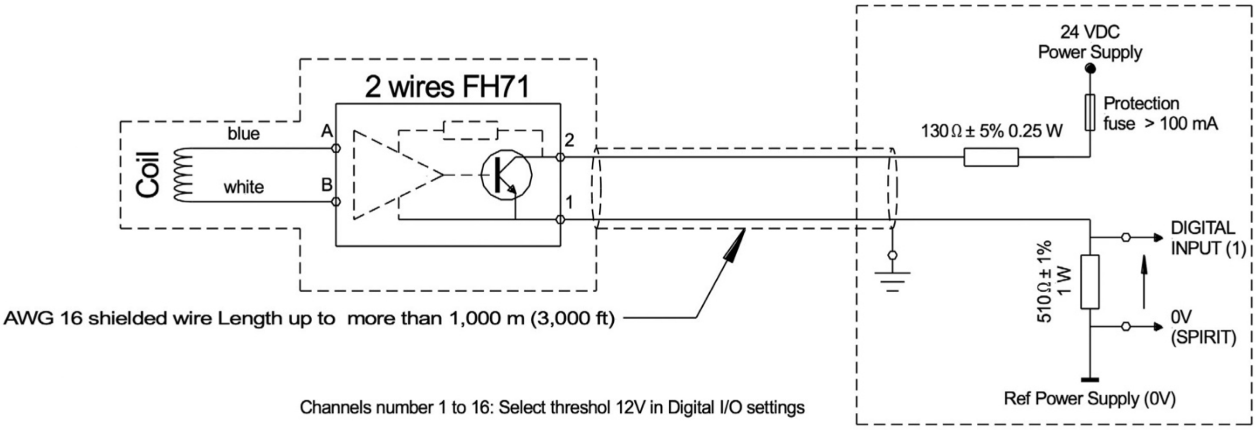
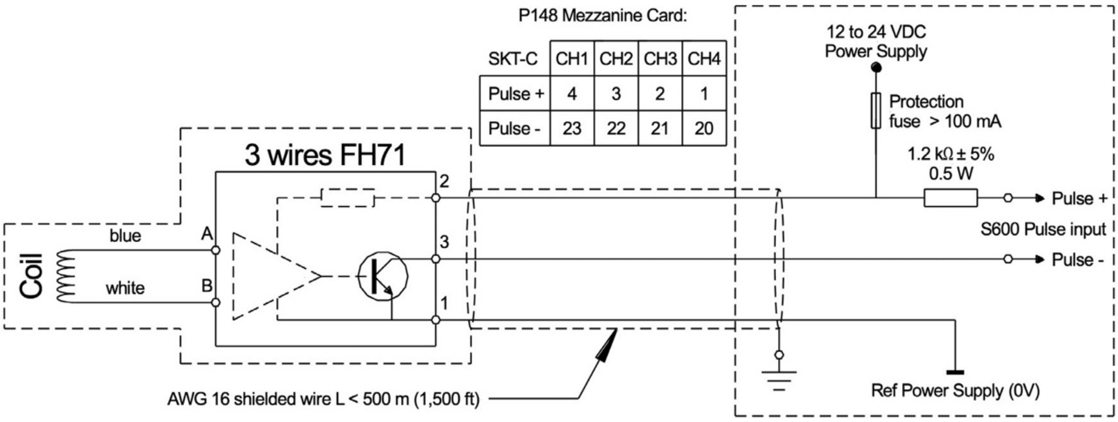
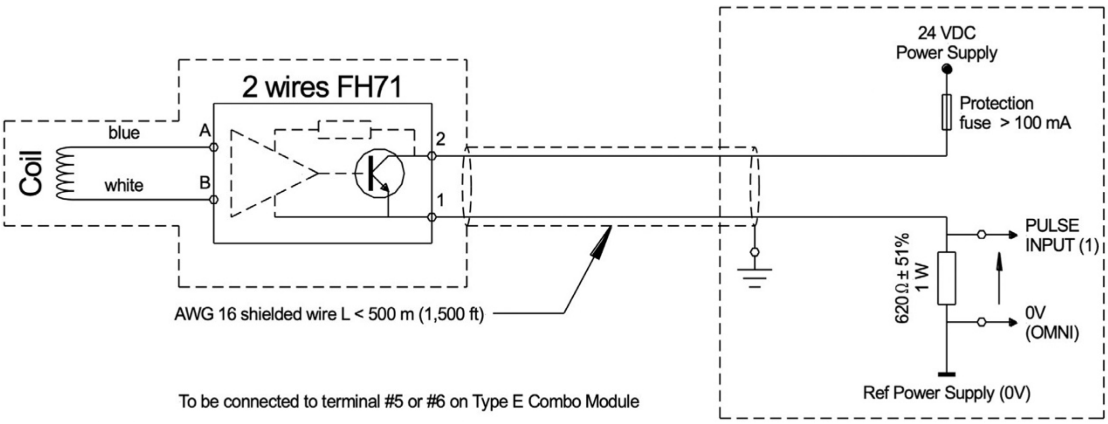


Figure 11. Example: Connecting a 2-wire preamplifier to a SPIRIT Flow-X calculator



SKT-C	CH1	CH2	CH3	CH4
Pulse +	4	3	2	1
Pulse -	23	22	21	20

Figure 12. Example: Connecting a 3-wire preamplifier to an Emerson S600 FloBoss calculator



Commissioning

After completing the mechanical assembly of the equipment on the meter run and the electrical connection of the pulse transmitter, proceed to fill the installation.

During initial filling of system, make sure any gas present in the pipe is purged by utilizing available venting systems or by passing through the flowmeter at very low flow rate.

Avoid sudden filling of the flowmeter; this helps prevent formation of gas "pockets", which can damage the rotor and / or bearing system.

Avoid extended use of the flowmeter beyond the specified operating maximum flow rates.

Maintenance

TLM meters require no special maintenance — as long as use remains within its operating limits.

For an application that is not subject to periodic verification, however, it is recommended that an audit of the measurement cartridge be carried out at least every three years.

This may result in a replacement of the pivoting system (shaft, bearings and cross-piece) in the factory.
TLM meters can remain charged (full of liquid) as long as the liquid does not significantly change consistency over time.

In any prolonged shutdown, it is recommended to leave the meter full, unless the liquid can crystallize or solidify. This will help avoid clogging of the shaft/bearing assembly.

Troubleshooting

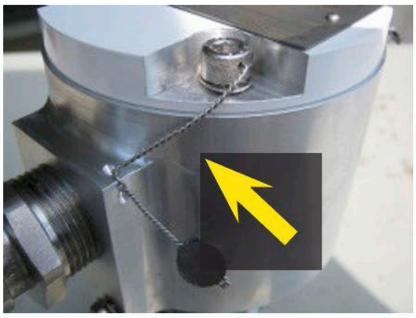
	PROBLEM	POTENTIAL CAUSE(S)
	Flowmeter overrates	1 – 2 – 5 - 7 – 8 – 9 – 10 – 11
	Flowmeter underrates	1 – 2 – 3 - 4 – 5 – 6 – 8 – 9 – 10 – 11
	Erratic indications	1 – 2 – 8 – 9 – 10 – 11
	No signal	2 – 3 – 4 – 6
	UNDERLYING ISSUE	**POSSIBLE SOLUTION(S)**
1	**Erratic pulses**	Check cable shield and connection Check for proper resistor selection (refer to wiring diagram) Inspect pickup coil and/or preamplifier; replace if necessary.
2	**Coil and/or preamplifier defect**	Check for proper wiring and resistor selection Check for preamp type selection (N, S, CO) Replace coil and/or preamp.
3	**Loss of magnets**	Replace the rotor
4	**Damaged shaft or bearings**	Replace bearing and/or shaft Depending upon damage, possibly replace rotor and/or crosspieces.
5	**Damaged rotor**	Replace the rotor
6	**Blocked rotor**	Inspect and clean bearing system, crosspieces and cartridge Replace the cartridge if necessary
7	**Deposits on internal walls**	Clean all the cartridge components Check installation conditions Check/Inspect upstream elements such as strainer, flow conditioner … Replace the cartridge if appropriate
8	**Flow profile deformation**	Clean all the cartridge components Check installation conditions Check/Inspect upstream elements such as strainer, flow conditioner … Replace the cartridge if appropriate
9	**Presence of gas in the flow**	Eliminate the source of gas Check installation conditions Install a deaerator
10	**Cavitation**	Check installation conditions Check/Inspect upstream elements (strainer, flow conditioner) Increase line pressure
11	**Performance**	Recalibrate Replace the cartridge if appropriate

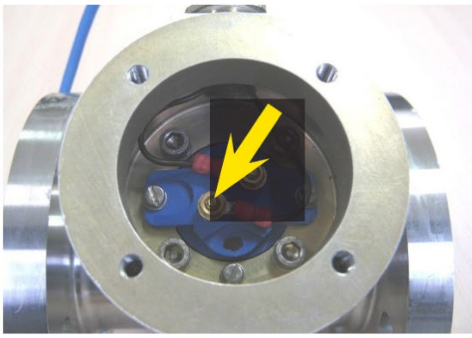
Repairs

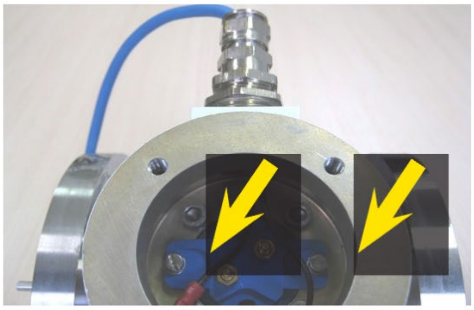
Replacing the preamplifier

Always perform this procedure respecting all safety precautions — and only after the electrical power supply is turned off. Refer to the Magnetic Sensors Technical Manual (TEC 07-02-07) if necessary.

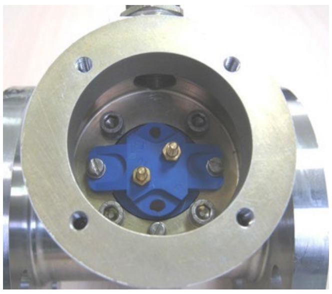
- Cut the sealing wire (if applicable).
- Unscrew the box lid (4 screws).

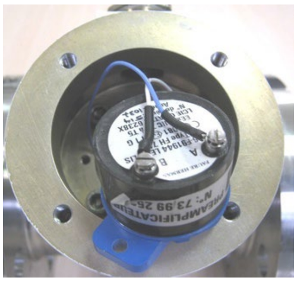






- **Disconnect the preamplifier from the site wiring (if applicable)**
- **Remove both screws that hold the preamplifier to its housing.**
- **Remove the preamplifier from its housing — making sure not to introduce any stress on the pick-up coil link cable.**
- **Disconnect the power cable from the preamplifier**





- **Proceed in reverse order for the installation of the new preamplifier.**
- **Reposition the lid and apply a torque of 6 Nm [4.4 ft.lb] when tightening the 4 screws.**
- **Set up a new sealing wire (if applicable).**

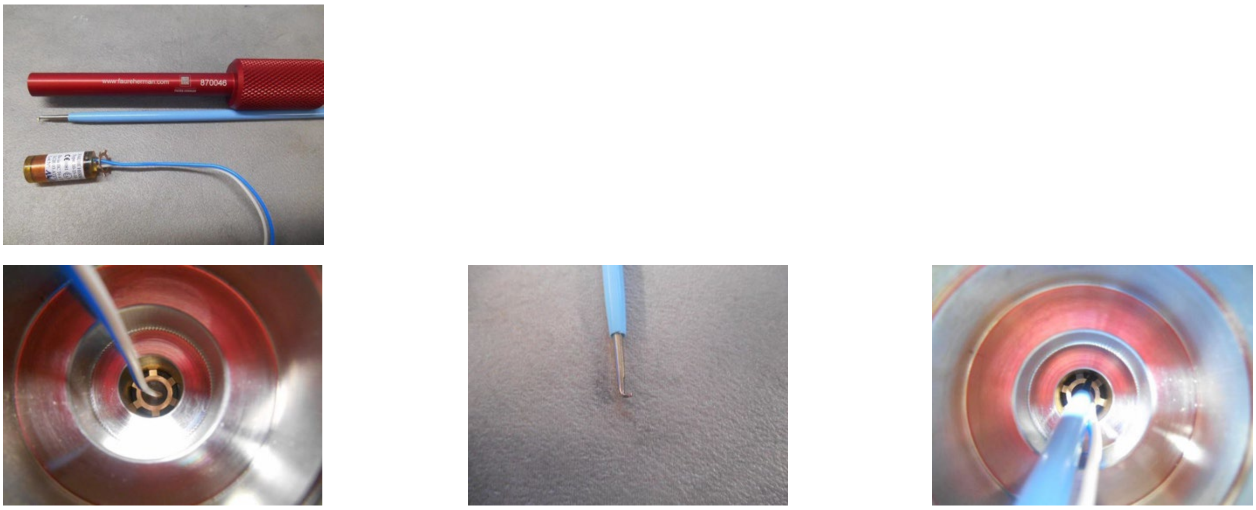
Figure 15. Replacing the preamplifier

Pick-up coil replacement

With locking ring

This can only be done after the preamplifier or the cover has been dismantled.

- Disconnect link cable between the pick-up coil and the preamplifier (or the cover).
- Extract the pick-up coil by releasing the ring using the intended tooling (ref. 870046)



Insert a new pick-up coil and ring, making sure the well bottom contact is used with the tools provided for this purpose (ref 870046).

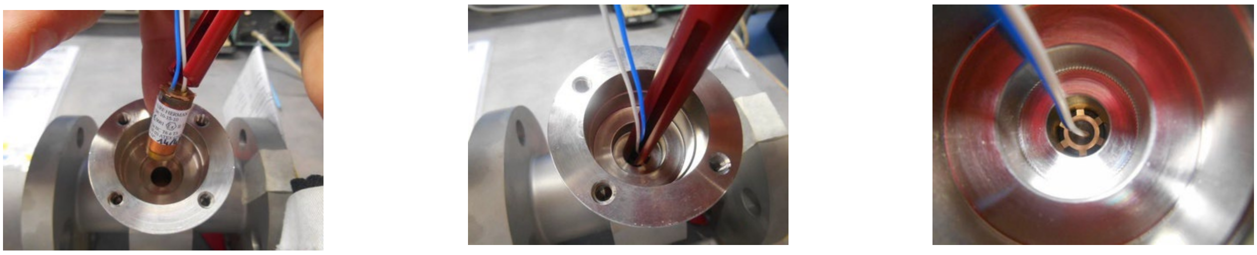


Figure 16. Disassembly/assembly of pick-up coil held by a ring

With screwed ring

This can only be done after the preamplifier or the boundary has been dismantled.

- Disconnect the link cable between the pick-up coil and the preamplifier
- Insert the tooling (ref. 870045) into the boss, making sure not to damage the pick-up coil cables, and loosen the ring.
- Place the new pick-up coil in the ring and carefully insert the cables into the tool.
- While keeping the cables outside the tool, insert the set into the boss well and screw the ring
- Remove the tool.

Figure 17. Illustration of Removal of Engineered Polymer Ring type pickup coil

Replacing the measurement assembly

The meter assembly (called a cartridge) is held in the body by a screwed "holding" ring downstream. To extract the cartridge:

- Position the meter vertically on the upstream flange to clear access to a downstream flange.
- Remove the holding ring to extract the meter cartridge.

IMPORTANT: Please note the flow direction (arrow engraved on outside of cartridge) before inserting the new assembly into the body and replace the inlet ring. The downstream side of the cartridge must be in contact with the holding ring.

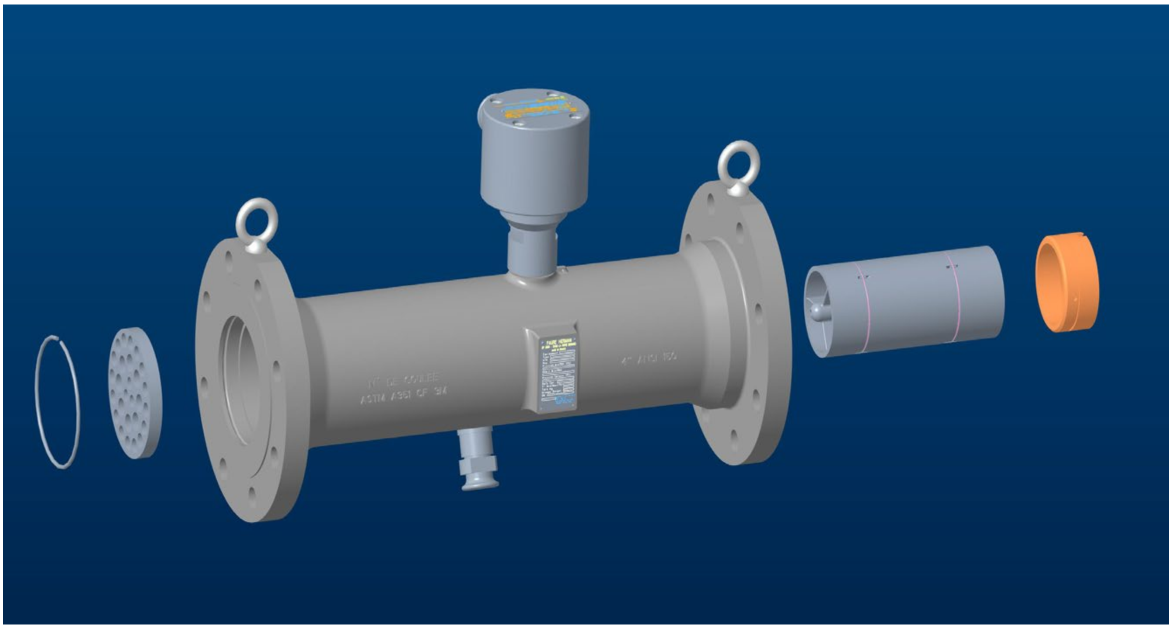


Figure 18. TLM

Equipment Disassembly

THIS EQUIPMENT OPERATES UNDER PRESSURE.
IT MUST BE DEPRESSURIZED AND DRAINED BEFORE BEING REMOVED FROM THE METER RUN (COMPLETE DISASSEMBLY OR INTERVENTION ON AN INTERNAL ELEMENT.

IMPORTANT: Make sure that the line is perfectly depressurized before loosening the binding bolts, and that the liquid will be fully collected in a retention bin (or equivalent).

Appendix 1 – Pressure Drop

The pressure drop across the meter, expressed in mbar, is as presented below for a 1 mm2/s viscosity fluid and a specific gravity of 1.

TLM	3-30	3-50	3-70	3-110	3-150	4-70	4-110	4-150	4-200	4-300
�P	200	480	200	500	900	200	410	780	550	1200

In the case of a viscosity and density fluid counting application, pressure drop can be assessed using the following expression:
ΔP= ΔPref × d × Ø 0.2

With
ΔP The meter's load loss at the maximum operating rate (mbar)
ΔP_{ref} Loss of load of the meter at the maximum operating rate (mbar) at the conditions of reference (see table)
d Measured liquid density
Ø Kinematic viscosity of the measured liquid (mm^2/s)

Appendix 2 - Volume/Frequency Relationship - K-factor

The Kf coefficient, expressing the number of pulses generated by the meter per unit of volume, is determined during calibration.
Depending on the adjustments made, taking into account in particular the viscosity of the liquid measured, the values in the table below are given only as an indication.

TLM	3-30	3-50	3-70	3-110	3-150	4-70	4-110	4-150	4-200	4-300
Kf (imp/dm³)	13.0	13.0	22.5	13.0	13.0	13.0	13.0	13.0	4.4	3.6
Qmin (m³/h)	3	5	7	11	15	7	11	15	20	30
Fmin (Hz)	11	18	44	40	55	25	40	55	25	30
Qmax (m³/h)	30	50	70	110	150	70	110	150	200	300
Fmax (Hz)	110	180	440	400	550	250	400	550	250	300

Appendix 3 - Operating Limitations - Special Precautions

The area of operation is defined on the indicator plate and specifies:

- Minimum / Maximum flow rate
- Maximum pressure
- Minimum / Maximum temperature

Flow limitations define the optimal performance area of the equipment (accuracy and repeatability of measurements). The maxi- mum value also defines the continuous operating limit. This limit may be exceeded occasionally (without exceeding 120% of the nominal capacity over short periods).
Pressure and temperature limitations relate exclusively to the mechanical sizing of the equipment and define the permitted area of operation.

Appendix 4: Safety information

IMPORTANT INFORMATION TO READ BEFORE INSTALLATION
This manual contains important safety instructions. It is essential to read and understand the operations to be carried out before the installation, connection and commissioning of the equipment
Failure to comply with these instructions and warnings can damage equipment and/or endanger personnel.

Staff requirements

Ensure that operators and maintenance personnel have and use all the safety equipment applicable to the area of operations (protection goggles, hearing protection, safety shoes, etc.) and are trained for the activities involved.
Unauthorized personnel should not have access to equipment installation and/or maintenance operations.

Risks arising from noncompliance with instructions and warnings

Any noncompliance with these instructions and warnings may:

- Expose staff to mechanical, electrical and/or chemical risks
- Damage equipment (meter)
- Pollute the environment by releasing harmful or polluting substances

Safety guidelines

To avoid electrical and pressure-related hazards, the power supply **must be disconnected**, and the meter **must be depressurized** before any intervention.
All safety guidelines included in this manual, as well as all safety regulations and recommendations in force in the country of installation must be respected.

Operating conditions

The area of operation informed on the indicator plate of the meter must be scrupulously respected. The reliability and performance of the equipment is only guaranteed if it is installed and operated as specified in this manual.
Equipment installation, operation and maintenance must be carried out using the appropriate tools. Never use a hammer or tools that could generate sparks or damage the electrical protection of the equipment (box, press, ducts, etc.). If shock keys are used, ensure that the torque values specified in this manual are respected.
Installation and maintenance of the equipment must be carried out by qualified personnel All spare parts must be approved in advance by FAURE HERMAN.

For additional information on the installation, use, or maintenance of the equipment, please contact the Support Service by email phone or via the website:

Customer support	
Hotline:	+33 (0)2 43 60 28 55 +1 713 623 0808 (USA)
Email:	services@faureherman.com
Website:	https://faureherman.com/

Repair and maintenance

Repairs and modifications to the equipment are only authorized after formal agreement from FAURE HERMAN. The use of spare parts not recognized by FAURE HERMAN relieves Faure HERMAN of responsibility for all the consequences associated with this original modification.

Transport, manutention et stockage

The meter should be handled with care to avoid damage. If the meter is equipped with lifting rings they must be used for handling. Under no circumstances should the meter be handled, lifted or placed on the electric boxes.

Unpacking

Upon receipt of the meter, check the general condition of the packaging in order to identify any damage sustained during transport. Remove the equipment from its packaging and check its general condition as well as the presence of this manual and the calibration certificate.

Storage

If the meter is not installed quickly after receipt, we recommend keeping it in its original packaging, free from severe weather conditions and possible shocks. If the meter is stored for a long period of time (more than 12 months), check the validity of the calibration under the applicable regulations.

Return

Contact FAURE HERMAN before any equipment returns to the factory. If the meter has been used to measure hazardous, toxic or corrosive liquids, it is imperative that the operator ensure that it has been properly decontaminated before being returned to the plant

Installation - ATEX & IECEx

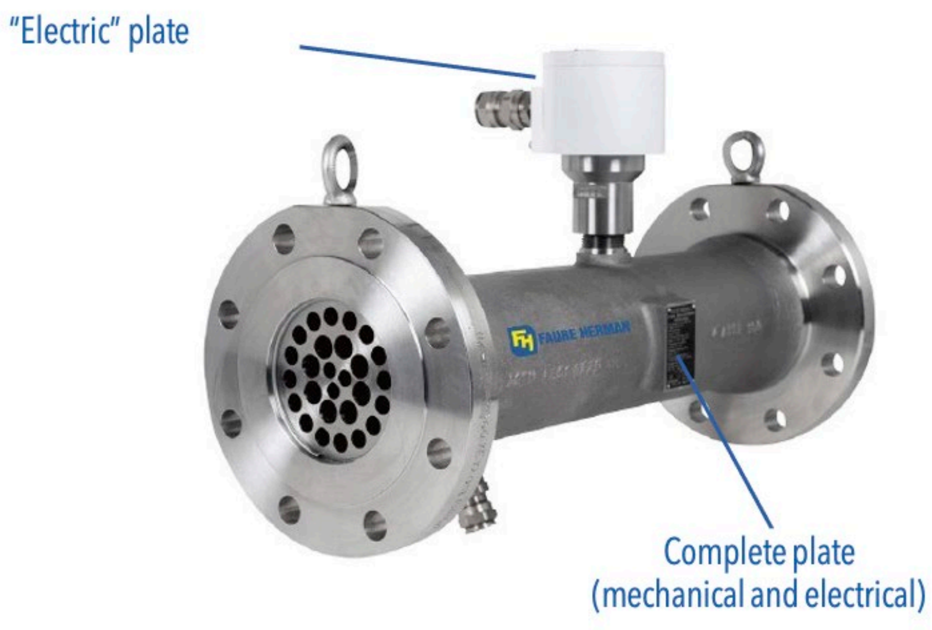
This equipment is certifiedd at ATEX and IECEx complies with the essential health and safety requirements for the design and construction of equipment to be used in potentially explosive atmospheres (Directive 2014/34/ EU).
Make sure the equipment is used in full compliance with the instructions given by the ATEX certificate and the nameplate.
This equipment incorporates ATEX-certified electrical and nonelectric components in the design and construction of equipment for use in explosive atmospheres (Directive 2014/34/EU).

General safety information

EQUIPMENT MUST REMAIN OFF DURING ALL INSTALLATION AND MAINTENANCE PHASES

For safe operation, the equipment must be used in accordance with the criteria set out in the ATEX/IECEx certificate and nameplate. Be sure to observer instructions on the equipment and components contained in the Present manual. The equipment must be installed and used exclusively in areas consistent with its protection index as specified by the indicator plate. If the equipment is connected to other electrical systems, make sure that the electrical protection systems carefully compatible.

According to the definition of the ATEX Directive, TLM turbine meters incorporate mechanical and electrical parts. The combination of the two certifications defines the protection system and the associated parameters of the meter



Risk analysis (Directive 2014/68/EU)

Appropriate resistance	Provisions
Excess temperature and pressure.	Taking into account temperatures and limit pressures when designing.
Influence of wind/snow.	Uninfluenced due to small surfaces.
Earthquakes.	The equipment is not intended for use in seismic zones. Otherwise it is up to the user to plan the appropriate devices.
Reaction of fastening supports and piping.	The equipment is intended to be connected to other pipes and does not have specific supports.
Heat fatigue.	Next design ASME B31.3. Choice of materials.
Mechanical fatigue.	Measurement instrument. It is up to the user to provide a stress-free installation.
Vibrations.	Measurement instrument. It is up to the user to provide an isolated/remote installation from the vibration sources.
Handling and Operation	**Provisions**
Closing and opening.	The equipment does not have an opening or closure.
Dangerous emissions from valves.	The equipment does not have a valve.
Inside.	The equipment has no access (manhole visit trap ...).
Surface temperature.	It is up to the user to report hot surfaces.
Unstable fluid decomposition.	The equipment is used during fluid transfer, not for storage.
Handling.	Equipment with a mass of more than 30 kg is equipped with lifting rings to allow them to handle them safely.
Purge and Ventilation	**Provisions**
Ram blow	Measurement instrument. It is up to the user to put in place the devices to prevent the presence of batters.
Collapse under the effect of vacuum.	Minimum service pressure greater than 1 barg shown on the plate. The equipment is not designed to operate in depression.
Corrosion and Chemical Attack	**Provisions**
Uniformly widespread.	Taking into account an over-thickness of corrosion. Choice of materials and application of paints adapted to the environment. It is up to the user to periodically check the status of its installation.
Selective.	Choice of materials.
Galvanic.	Choice and compatibility of materials.
By differential aeration.	It is up to the user to set up the appropriate devices (mass braid, cathode protection ...).
Cavernous by inter-granular sting.	Choice of materials. Keep equipment full of liquid.
Ammonia.	Choice of materials. Compliance with NACE MR0175 requirements if applicable.
Under duress.	Choice of materials. Compliance with NACE MR0175 requirements if applicable.
Wear	**Provisions**
Erosion/ corrosion.	Choice of materials. Application of an over-thickness of corrosion. Application of environmentally appropriate paints.
Corrosion cavitation.	Choice of materials. Measurement instrument. It is up to the user to put in place the devices to avoid cavitation.
Abrasion.	Choice of materials. Application of an over-thickness of corrosion. It is up to the user to periodically check the condition of the equipment.

Recommandations ATEX

If applicable, this equipment is ATEX certified and complies with essential safety and health requirements for the design and con- struction of devices for use in exploding atmospheres (Directive 2014/ 34/EU).
For safe use, make sure the equipment is used in accordance with the ATEX certificate and identification plate and follow the operat- ing manuals, installation and maintenance of the equipment and subsets that make up it.
The installation, use and maintenance must be carried out by trained and specialized personnel adhering to the guidance of this
manual.

If you are missing a manual or for any other information, contact Faure Herman.

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Faure Herman
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